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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/284,222	07/22/1999	HISASHI TSUJIMOTO	P990708	2037

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EXAMINER

DOVE, TRACY MAE

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 07/17/2003

33

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/284,222

Applicant(s)

TSUJIMOTO ET AL.

Examiner

Tracy Dove

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-9 and 12-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-9 and 12-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 July 1999 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

This Office Action is in response to the communication filed on 5/22/03. Applicant's arguments have been considered, but are moot in view of the new grounds of rejection. Claims 7-9 and 12-18 are pending. Claims 1-6, 10 and 11 have been canceled.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/22/03 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 7-9 and 12-18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 7 recites "the binder comprising a mixture of a fluorine polymer and an aromatic vinyl-conjugate diene polymer", and further recites, "wherein the mixture of the fluorine polymer and the aromatic vinyl-conjugate diene polymer of the binder comprises from 10 weight percent to about 15 weight percent of a total weight of the negative electrode". The

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specification only supports a binder amount of 10-15 wt% when the binder *consists of* the fluorine polymer and the aromatic vinyl-conjugate diene polymer. See page 6 and the Examples of the instant specification. Claims 12 and 13 contain new matter because the total binder weight percent of the negative electrode cannot exceed 15 wt% (page 6).

Claims 17 and 18 recite weight mixture ratios of the fluorine polymer to the aromatic vinyl-conjugate diene polymer. However, the recited weight ratios are only supported when polyvinylidene fluoride (PVDF) is the fluorine polymer and styrene-butadiene latex (SBR) is the aromatic vinyl-conjugate diene polymer. See Examples 3 and 4 regarding the ratios disclosed by claims 17 and 18. Note that SBR is the only specific aromatic vinyl-conjugate diene polymer disclosed by the specification (see page 6).

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

known in art
The term "a non-graphitizing carbon material" in claim 14 is a relative term which renders the claim indefinite. The term "a non-graphitizing carbon material" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Specifically, it is unclear which of the carbon material described in the specification on pages 4-5 are "non-graphitizing carbon material".

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7-9, 12 and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozaki et al., JP 06-215761, as evidenced by Koga et al., US 5,565,284 and Sonobe et al., US 5,527,643 and Hasegawa et al., US 5,609,975 and Yamada et al., US 5,576,121.

Ozaki teaches a nonaqueous electrolyte rechargeable battery comprising a positive electrode, a negative electrode, an electrolyte and a separator. The positive electrode is formed by applying an active material paste to both sides (first and second positive layers) of an aluminum foil (current collector). See paragraph 0026. The positive active material may be LiCoO_2 (paragraph 0022). The negative electrode contains a graphite (carbonaceous) active material and a mixed binder material. The binder is a mixture of a non-fluorine system organic polymer and a fluorine system organic polymer. A paste containing graphite and the mixed binder is applied to both sides (first and second negative layers) of a copper foil (current collector). See paragraph 0011. The non-fluorine system organic polymer may be styrene-butadiene rubber (aromatic vinyl-conjugate diene polymer) and the fluorine system organic polymer may be polytetrafluoroethylene (paragraph 0027). The fluorine system organic polymer is 20-50 wt% of the mixed binder (paragraph 0016). Thus, if the fluorine system polymer is 50 wt% of the binder, a weight ratio of fluorine system polymer to non-fluorine system polymer is 1:1. The positive electrode and negative electrode are wound via a separator and put in a case to form a cylindrical shape cell (paragraph 0025 and Figure 1). A carboxymethyl-cellulose

thickening agent may be added to the negative electrode (paragraphs 0019 and 0027). The negative electrode material is not limited to graphite, but may be carbon materials such as cokes, mesophase carbon, pyrolytic carbon, mesophase pitch and carbon fiber (paragraph 0012).

Ozaki does not explicitly state the binder comprises 10-15 wt% of the negative electrode.

7 However, Ozaki teaches the binder comprises 3-7 wt% of the negative electrode. Less than 3 wt% binder is inadequate and results in capacity degradation. More than 7 wt% results in a decreased pack density, decreased conductivity and increased internal resistance.

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have found the claimed binder range of 10-15 wt% obvious in view of the teachings of Ozaki. Ozaki teaches that if the binder content is greater than 7 wt% a cell having undesirable properties, such as decreased conductivity, increased internal resistance and decreased pack density, results. Thus, Ozaki suggests a binder content greater than 7 wt%, though it results in a battery with undesirable properties. Thus, the burden shifts to Applicant to show the claimed binder range of 10-15 wt% is critical and/or establish the claimed binder range has unexpected results. Specifically, Applicant must show that the expected result of increasing the binder content to 10-15 wt% does not result in decreased conductivity, increased internal resistance and/or decreased pack density (expected result based on the teachings of the prior art). It is well known that increasing the binder content of the negative electrode decreases capacity and increases internal resistance of the battery. This is because increasing the binder content results in less space available for the active material of the negative electrode. Less active material results in decreased capacity. Increasing the binder content results in greater distance between the particles of the active

material, thus increasing the internal resistance of the battery. This is evidenced by Koga, Sonobe, Hasegawa and Yamada. Koga teaches the amount of binder added is preferably about 3-13 parts by weight per 100 parts by weight of the electrode material. Smaller amounts of binder material provide less adhesion whereas larger amounts of binder material result in an insufficient cell capacity (col. 6, lines 36-41). Sonobe teaches if the amount of the binder is excessive, the resultant electrode is liable to have too large an electric resistance and provide a battery with a large internal resistance (col. 8, lines 44-51). Hasegawa teaches a smaller amount of active material undesirably lowers the capacity of the electrode while a greater amount of binder prevents smooth current collection that lowers the capacity (col. 12, lines 62-66). Yamada teaches increasing the binder amount of the electrode increases resistance and reduces the discharge capacity of the battery. All four evidence references are directed toward lithium secondary batteries.

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Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ozaki et al., JP 06-215761 (as evidenced by Koga et al., US 5,565,284 and Sonobe et al., US 5,527,643 and Hasegawa et al., US 5,609,975 and Yamada et al., US 5,576,121) in view of Abe et al., JP 8-195201.

See discussion of Ozaki above.

Ozaki does not explicitly teach the amount of the cellulose derivative added to the negative electrode.

However, Abe teaches a nonaqueous battery negative electrode mix which is high in viscosity. Abe teaches that it is known to mix water and carboxymethyl cellulose (CMC)

together, then add polyvinylidene fluoride, acetylene black and graphite to obtain the negative electrode mix. Abe teaches that aggregates such as binder aggregate and carbon aggregate in the negative electrode mix can be reduced without the viscosity of the negative electrode mix being lowered. Abe teaches the CMC was added in an amount of 0.5-5 wt% as a thickener to the binder composition (see paragraphs [0008] and [0010]).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include 0.1-5 wt % of CMC in a binder composition of Ozaki because Abe teaches this amount of CMC is known. Ozaki teaches a CMC thickening agent is added to the negative electrode. One of skill would be motivated to combine Abe and Ozaki because they both teach negative electrodes for nonaqueous batteries containing carbon material, a binder material and CMC. Abe is applied to show a prior art teaching of an amount of CMC added to the negative electrode mix. Both Abe and Ozaki teach that CMC is added to the negative electrode mix as a thickening agent.

Response to Arguments

Applicant's arguments with respect to claims 7-9 and 12-18 have been considered but are moot in view of the new ground(s) of rejection.


Note Applicant states Table 2 of the specification demonstrates that the claimed binder content provides beneficial effects with respect to the initial capacity and the short circuit temperature. However, Table 2 does not demonstrate beneficial effects for the claimed binder range (10-15 wt%). Specifically, Table 2 shows that for a binder content of 5 wt%, the initial capacity and short circuit temperature results lie between those results indicated for a binder content of 10 wt% and a binder content of 15 wt %. Evidence of unexpected results must be

between the instant claims and the prior art of record. Since a binder content of 5 wt% falls with the binder content range of the prior art, Applicant has not distinguished the instant claims over Ozaki.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is (703) 308-8821. The Examiner may normally be reached Monday-Thursday (9:00 AM-7:30 PM). My supervisor is Pat Ryan, who can be reached at (703) 308-2383. The Art Unit receptionist can be reached at (703) 308-0661 and the official fax numbers are 703-872-9310 (after non-final) and 703-872-9311 (after final).

Tracy Dove
Patent Examiner
Technology Center 1700
Art Unit 1745


7/14/03